What is claimed is:

1. A method for initializing a time-domain equalizer (TEQ) comprised in a receiver of a multi-carrier communication system, the method comprising:

   estimating a channel impulse response (CIR) h[n] according to a received symbol, wherein the received symbol includes a cyclic prefix with ν points and a data portion with N points, wherein i=0~N-1;

   selecting one of a plurality of groups according to the total energy of the groups, wherein each group includes consecutive v points of the received symbol;

   modifying the channel impulse response (CIR) h[n] according to the selected group to generate a modified channel impulse response h'[n];

   generating a target impulse response b[n] according to the modified channel impulse response h'[n] and a window mask m[n], wherein i=0~N-1;

   transforming the channel impulse response (CIR) h[n] and the target impulse response b[n] to a frequency-domain to generate a frequency-domain channel impulse response H(i) and a frequency-domain target impulse response B(i) respectively, wherein i=0~N-1; and

   generating a frequency-domain impulse response W(i) of the time-domain equalizer according to the frequency-domain channel impulse response H(i) and the frequency-domain target impulse response B(i);

   wherein the frequency-domain target impulse response B(i) and the frequency-domain TEQ impulse response W(i) are for initializing the TEQ.

2. The method of claim 1, wherein the h[n] and the b[n] are transformed to frequency domain by Fast Fourier Transform (FFT).

3. The method of claim 1, wherein the value of v is smaller than or equal to ν.

4. The method of claim 1, wherein the total energy of the selected group is maximum among that of all other groups;

5. The method of claim 4, wherein the group with v consecutive points with the maximum total energy is selected by performing a cyclic search through N points of h[n].

6. The method of claim 1, wherein the channel impulse response (CIR) h[n] are modified by setting all the remaining points outside the selected group to zero.

7. The method of claim 1, wherein the target impulse response b[n] is generated by convolution the modified channel impulse response h'[n] and the window mask m[n].

8. The method of claim 1, wherein the window mask m[n] is to further modify the modified estimated CIR h[n] to reduce the difference of value between at least one boundary point of the selected group and at least one point outside and adjacent to the selected group.

9. The method of claim 1, wherein the window mask m[n] is to further modify the modified estimated CIR h[n] such that the value of the "tail" of the initial b[n] is decreased gradually.

10. The method of claim 9, wherein the time-domain window mask m[n] is $m[n]=\begin{cases} 1; k \le n \le i \\ \dfrac{(k+v-1)-n}{(k+v-1)-i}; i < n \le (k+v-1) \\ 0; others \end{cases}$, wherein i is an integer between k and k+v-1.

11.The method of claim 9, wherein the time-domain window mask m[n] is

$$m[n]=\begin{cases}\frac{n-k}{i-k}; k\le n\le i\\ \frac{(k+v-1)-n}{(k+v-1)-i}; i<n\le(k+v-1)\\ 0; others\end{cases}$$, wherein i is an integer between k and k+v-1.

12.The method of claim 1, wherein if the selected group of consecutive v points of h[n] are h[k] to h[k+v-1], then the values of m[k] to m[k+v-1] of the window mask m[n] are set to lie between zero and one while the values of all other points of m[n] are set to be zero.

13.The method of claim 1, wherein the TEQ impulse response W(i) is determined through the frequency-domain target impulse response B(i) dividing by the frequency-domain impulse response H(i).

14. A method for initializing a time-domain equalizer (TEQ) comprised in a receiver of a multi-carrier communication system, the method comprising:

estimating a channel impulse response (CIR) h[n] according to a received symbol, wherein the received symbol includes a cyclic prefix with v points and a data portion with N points, wherein i=0~N-1;

selecting one of a plurality of groups according to the total energy of the groups, wherein each group includes consecutive v-l_w points of the received symbol, wherein l_w is the length of the TEQ impulse response;

modifying the channel impulse response (CIR) h[n] according to the selected group to generate a modified channel impulse response h'[n];

determining a frequency-domain impulse response W(i) according to a frequency-domain modified channel impulse response H'(i), wherein i=0~N-1; and

determining a frequency-domain target impulse response B(i) according to the frequency-domain impulse response W(i) and a frequency-domain CIR H(i), wherein i=0~N-1;

wherein the frequency-domain target impulse response B(i) and the frequency-domain TEQ impulse response W(i) are for initializing the

TEQ.

15. The method of claim 14, wherein the h[n] and the h'[n] are transformed to frequency domain by Fast Fourier Transform (FFT).

16. The method of claim 14, wherein the value of v is smaller than or equal to v.

17. The method of claim 14, wherein the total energy of the selected group is maximum among that of all other groups;

18. The method of claim 17, wherein the group with v- l_w consecutive points with the maximum total energy is selected by performing a cyclic search through N points of h[n].

19. The method of claim 14, wherein the modified channel impulse response h'[n] is generated by:

removing the selected v- l_w points from the CIR h[n];

combining the remaining N-v+ l_w points; and

padding zero to the last v- l_w points of the CIR h[n].

20. The method of claim 14, wherein the frequency-domain impulse response W(i) is determined to be the reciprocal of the frequency-domain modified channel impulse response H'(i).

21. The method of claim 14, wherein the frequency-domain target impulse response B(i) is determined by multiplying the frequency-domain impulse response W(i) and the frequency-domain CIR H(i)

22. A method for adapting a time-domain equalizer (TEQ) comprised in a receiver of a multi-carrier communication system, the method comprising:

determining a frequency-domain TEQ impulse response Wk(i) and a frequency-domain target impulse response Bk(i) for initializing the TEQ, wherein i=0~N-1;

generating a modified TEQ impulse response $w_{k,w}(i)$ and a modified target impulse response $b_{k.w}(i)$ according to a time-domain TEQ impulse response $w_k(i)$ and a time-domain target impulse response

$b_k(i)$;

determining a error term $E_k(i)$ according to the modified TEQ impulse response $w_{k,w}(i)$, a modified target impulse response $b_{k,w}(i)$, and a frequency-domain channel impulse response (CIR) $H(i)$;

adjusting the frequency-domain TEQ impulse response $W_k(i)$ to generate a adjusted frequency-domain TEQ impulse response $W_{k+1}(i)$ through performing a least mean square (LMS) operation according to the error term $E_k(i)$, a frequency-domain modified TEQ impulse response $W_{k,w}(i)$, a frequency-domain channel impulse response (CIR) $H(i)$, and a stepsize coefficient μ, wherein the stepsize coefficient μ in a time-varying coefficient;

generating a modified adjusted frequency-domain TEQ impulse response $W_{k+1,w}(i)$ according to the adjusted frequency-domain TEQ impulse response $W_{k+1}(i)$; and

adjusting the frequency-domain target impulse response $B_k(i)$ to generate a adjusted frequency-domain target impulse response $B_{k+1}(i)$ according to the modified adjusted frequency-domain TEQ impulse response $W_{k+1,w}(i)$ and the frequency-domain channel impulse response (CIR) $H(i)$.

23. The method of claim 22, wherein the adapting method is performed repeatedly to iteratively adjust the frequency-domain target impulse response and the frequency-domain TEQ impulse response, and an index k represents the time of the adapting method has been performed.

24. The method of claim 23, wherein the stepsize coefficient μ is a time-varying coefficient through the whole adapting process.

25. The method of claim 24, wherein the stepsize coefficient μ is dynamically adjusted through the whole adapting process to prevent divergence at a early stage of the adapting process and to prevent slow convergence at a late stage of the adaptive process.

26. The method of claim 25, wherein the value of the stepsize coefficient

μ is a small value at a early stage of the adapting process and the value of the stepsize coefficient μ is a large value at a late stage of the adapting process.

27. The method of claim 26, wherein the value of the stepsize coefficient μ is small and increase gradually at the early stage of the adapting process.

28. The method of claim 26, wherein the value of the stepsize coefficient μ is a constant at the late stage of the adapting process.

29. The method of claim 26, wherein the value of the stepsize coefficient μ is in proportion to the reciprocal of the power of the frequency-domain channel impulse response (CIR) H(i).

30. The method of claim 26, wherein the value of the stepsize coefficient μ is determined by the following equation:

$$\mu(k) = \frac{const}{power(H)} \times \log \frac{power(Wk)}{power(Wk - Wk - 1)}$$

, wherein power(H) represents the power of the frequency-domain channel impulse response (CIR) H(i), power(W_k) represents the power of the frequency-domain TEQ impulse response W_k(i), and power(W_k-W_{k-1}) represents the power of a change of the frequency-domain TEQ impulse response W_k(i)-W_{k-1}(i).

31. The method of claim 26, wherein the value of the stepsize coefficient μ is determined by the following equation:

$$\mu(k) = \frac{const}{power(H)} \times f(k)$$

, wherein power(H) represents the power of the frequency-domain channel impulse response (CIR) H(i) and f(k) represents a fitting curve function.

32. The method of claim 31, wherein the fitting curve function is

if k<=M, then f(k)=k/M;

if k>M, f(k)=1, wherein the index k represents the time of the adapting method has been performed and M is an integer between 10 and 20.